



Potential Economic Loss Associated with Emerald Ash Borer on Ash in Iowa

Background

Emerald Ash Borer (*Agrilus planipennis*) is a small green invasive wood boring beetle that attacks and kills ash trees. The adults live on the outside of ash trees feeding on the leaves during the summer months. The larvae look similar to white grubs and feed on the living plant tissue (phloem and cambium) underneath the bark of ash trees. The trees are killed by the tunneling activity of the larvae under the tree's bark, which disrupts the vascular flow.

The metallic green beetle is native to East Asia and was imported to the United States within the wood of shipping crates from China. Emerald Ash Borer (EAB) was first discovered in North America near Detroit, Michigan in 2002. Since the first discovery it has also been found in Illinois, Indiana, Maryland, Michigan, Missouri, Ohio, Pennsylvania, West Virginia, Wisconsin, and Virginia. It has also been found in Ontario and Quebec Canada.

EAB is 100 percent fatal to our native ash trees of any size, age, or stage of health. Millions of ash trees have already been killed in infested areas. Much of Iowa's forestland is densely populated with ash trees, and Iowa's community street trees are heavily planted with ash cultivars. U.S. Forest Service 2011 inventory indicates that there are 52 million woodland ash trees and 3.1 million urban ash trees. Take a moment to think about how many ash trees are in your yard, neighborhood, community, and woodlands. Then imagine those areas without ash trees. Trees that have been attacked by EAB can die within 2 years.

Research has shown that EAB can only fly a few miles, which helps slow its natural spread. However, it is easily transported to new areas when people inadvertently move emerald ash borer larvae inside of infested firewood, ash nursery stock, and other ash items. Please do not move firewood from infested areas into non-infested areas.

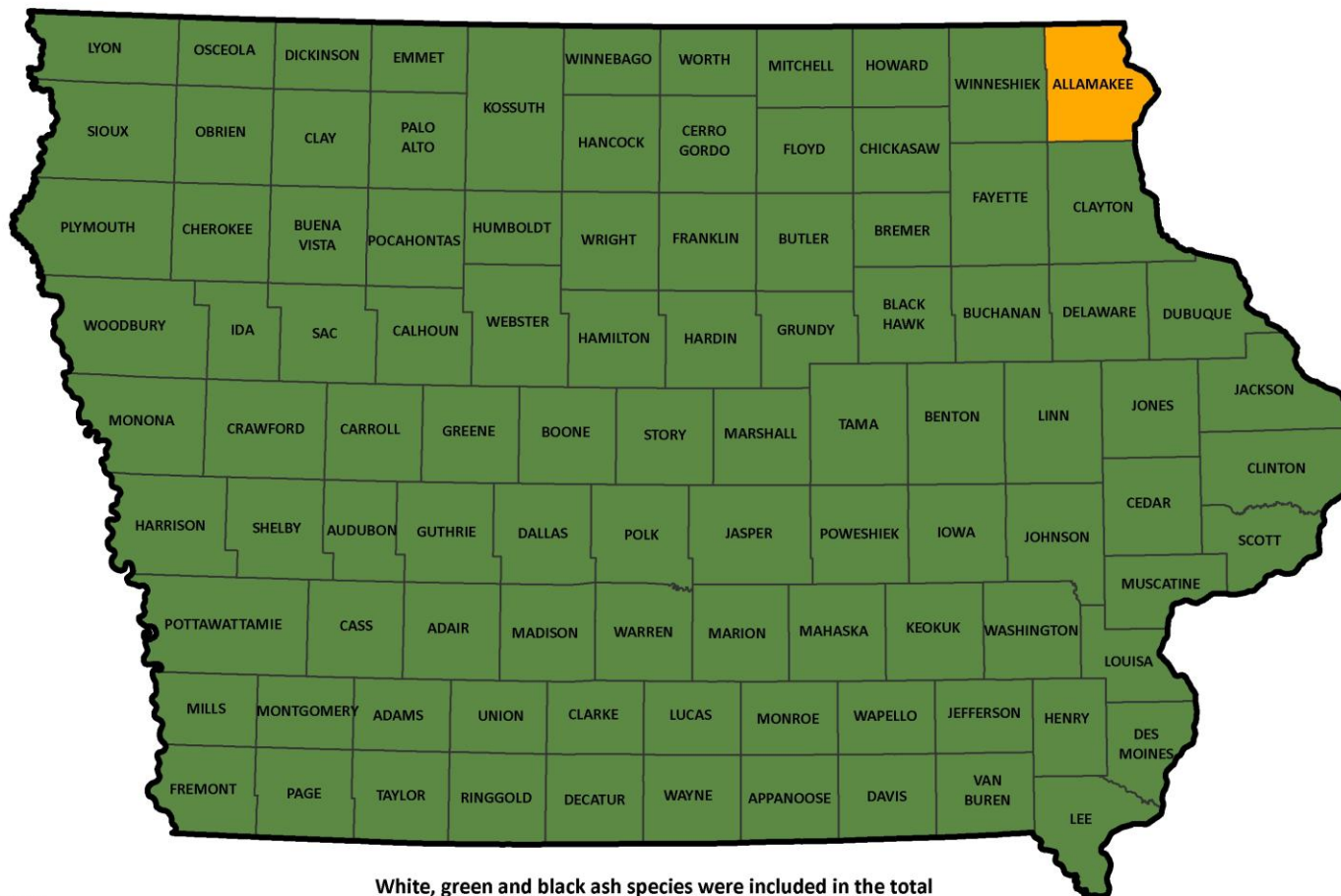
During a site visit in May of 2010, four EAB larvae were found in an ash tree growing on an island in the Mississippi River about 2 miles south of the Minnesota border in Allamakee County. This was Iowa's first confirmation of EAB. During the 2012 monitoring season, two sentinel trap trees and two purple prism traps captured EAB in Allamakee County. The furthest



west find is at Black Hawk Point in Allamakee County. A quarantine prohibiting the movement of firewood, ash nursery stock, ash timber, or any other article that could further spread EAB is in effect from the Iowa Department of Agriculture and Land Stewardship and USDA-APHIS-PPQ.

The map below show the number of ash trees at risk to emerald ash borer in the county that is infested and statewide.

PRESENCE OF EMERALD ASH BORER

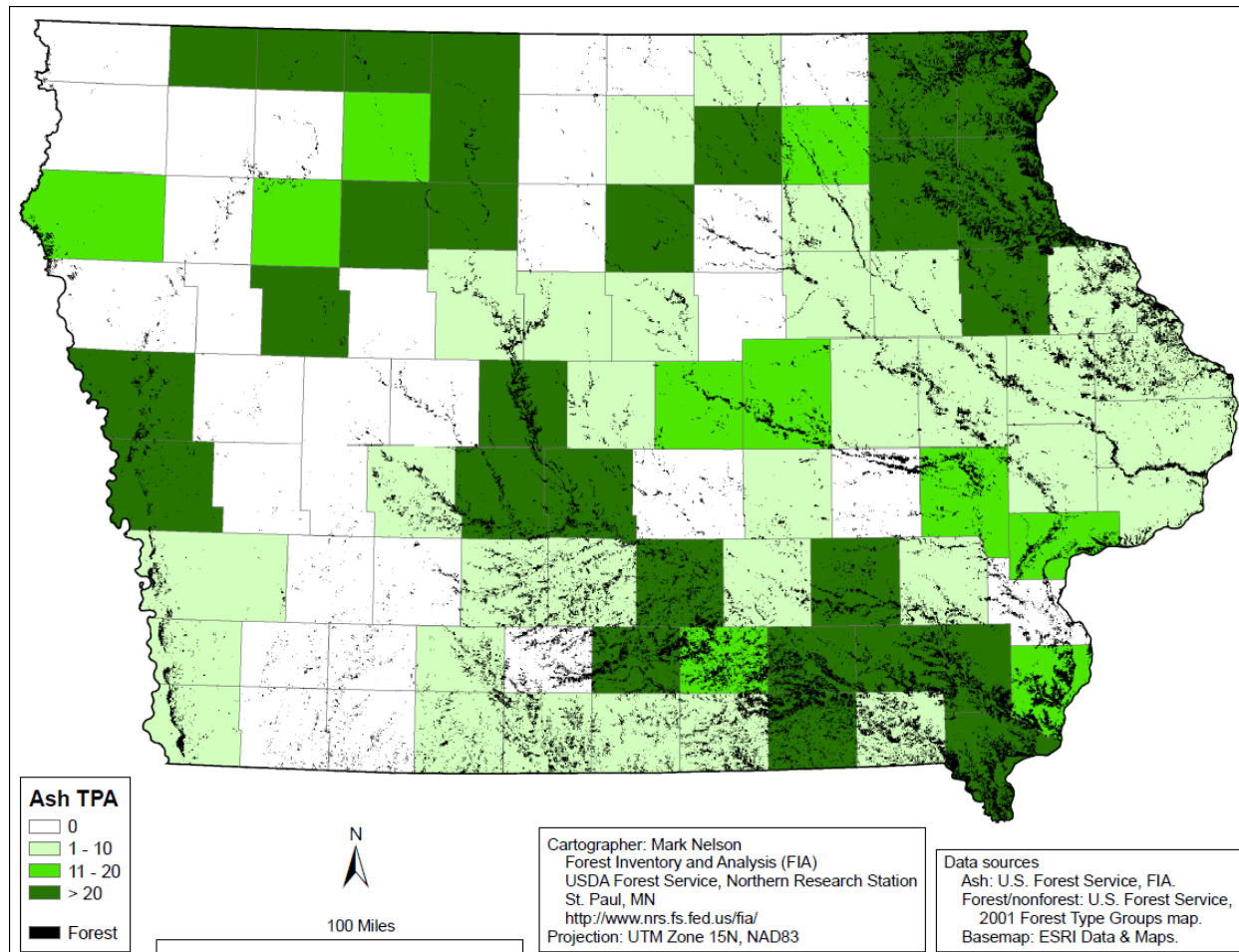


EAB Present
 No
 Yes
 Forest

White, green and black ash species were included in the total numbers. Tree numbers are based on Forest Service, Forest Inventory Assessment (FIA) data from 2008.

Statewide total ash trees = 52,561,078.
 Ash trees in Allamakee County = 3,737,297.

Map created September 17, 2010



The map above shows the distribution of ash trees within Iowa's forests at a county level. The dark green areas have more ash trees per acre (TPA) than the other shades of green, meaning these counties will be impacted the most by EAB.

When will EAB get to my Community?

The EAB simulation below shows the average prediction of spread from 100 different EAB scenario simulations.¹ The simulation above does not take into account long distance dispersal of EAB caused by people and does not predict the establishment of outlier populations. To the extent that the establishment of outlier EAB populations increases the rate at which counties become infested, the model underestimates the progression of spread and the discounted cost of treatment, removal, and replacement.

Case in Point- City of Dubuque

Like most communities, Dubuque turned to ash trees as a primary replacement street tree after Dutch elm disease (DED) hit in the 1950's and 1960's. Ash trees seemed like a great replacement for elm trees at the time. They were very tolerant of urban conditions, had few known pest and disease problems and transplanted easily. As improved cultivars were developed like Patmore, Summit, Autumn Applause and Autumn Purple, they became even more heavily planted, both as street trees and trees in the home landscape.



When the Emerald Ash Borer arrives, the potential cost to communities like Dubuque will be in the millions of dollars. Today, Dubuque's street tree population is 23.9% ash or 1,271 trees. It is unknown how many more ash trees exist in home landscapes, parks, and on Dubuque's many hillsides.

The estimated value of Dubuque's ash tree population (street trees only) is \$1.3 million. This estimate was derived using 2009 survey information and the *CTLA, Guide for Plant Appraisal, Ninth Edition*.

Dubuque's current Forestry Activity budget and staffing level will be inadequate to handle the hundreds of tree removals and replacements anticipated. To contract the removal of 1,271 trees and stumps, it is estimated to cost \$1 million. Replacing that same number of trees is estimated to cost another \$324,000.

Not only will Dubuque be hurt aesthetically by the loss of all its ash trees, it will also suffer as a result of the many lost benefits that those trees are currently providing to our

¹ Kovacs, Kent F., Robert G. Haight, and Deborah G. McCullough. "Cost of Potential Emerald Ash Borer Damage in U.S. Communities, 2009-2019." *Treesearch - Forest Service Research & Development*. Web. 19 Nov. 2010. <<http://www.treesearch.fs.fed.us/pubs/34370>>.

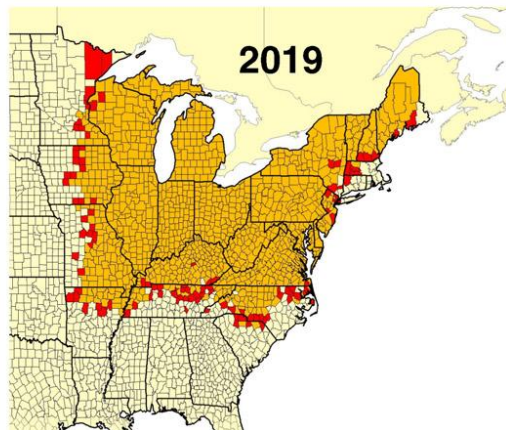
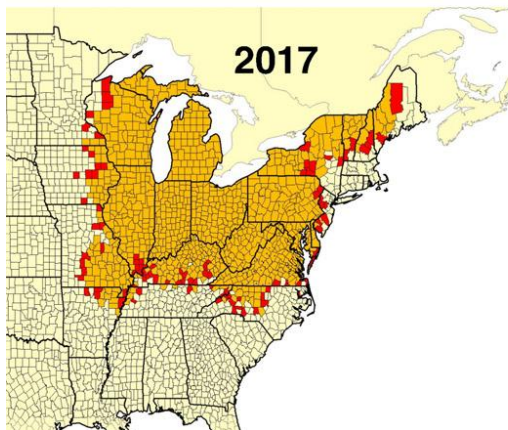
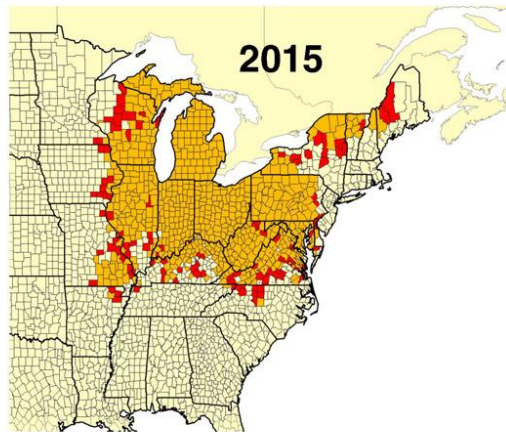
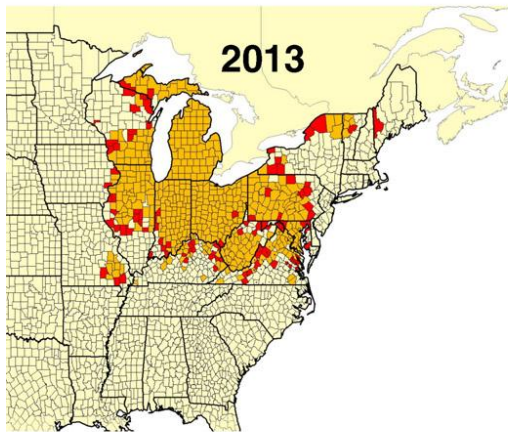
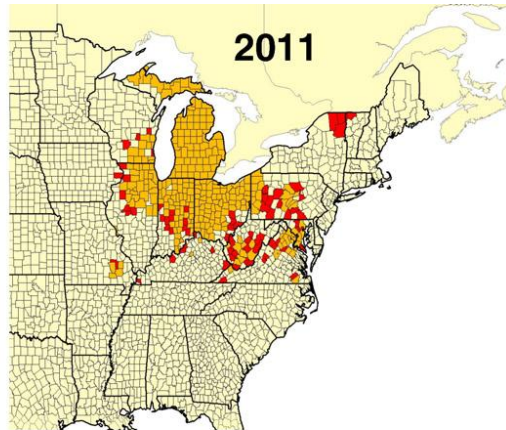
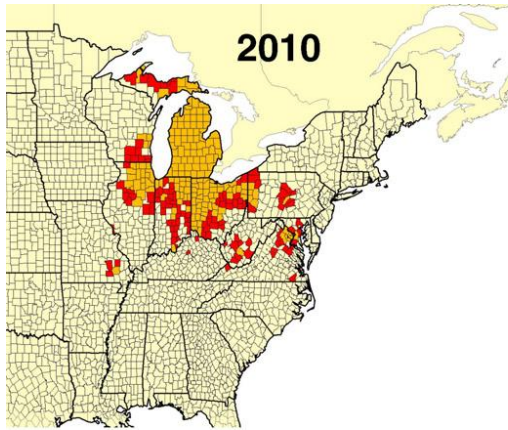
community. Things like higher property values, the cooling effect once felt on tree-lined streets, storm water runoff control and filtering, and clean air to name a few.

When EAB hits, we will be provided the opportunity to better diversify our street tree population using other native species. New trees will be planted in wider planting lawns following our *Street Tree and Landscaping on City Right-of-Way Policy* guidelines; guidelines that were not in existence when most of our street tree population was planted following DED days.

Case in Point- City of Waterloo

The City of Waterloo has many concerns about the impact EAB will have on our community. Waterloo will lose 17% of its urban forest when EAB is done killing the ash trees within this community. These 5,634 ash trees currently provide just under \$1 million of benefits per year to our community in the form of storm water runoff retention, increased property values, energy conservation, improved air quality, and carbon sequestration. An EAB infestation in Waterloo will sacrifice our current level of service provided to the citizens of Waterloo as the ash removal and replanting efforts take people and resources away from current projects.

Financial sources for the contractual removal of many of the ash trees will need to be determined well before EAB arrival. Infested debris will also be a challenge to recycle or dispose of with quarantines in place. Public safety is a big concern for city officials, as streets become lined with dead ash trees dropping large, decayed limbs causing property damage or personal injury. Waterloo is currently preparing to address these concerns that EAB will present with the development of Waterloo's EAB Preparedness Plan. Most in Waterloo have heard of the Emerald Ash Borer, but few are prepared for the magnitude of this critter's impact on our community.



Control

Long term costs are one of the key issues when deciding whether to remove your ash tree. In most cases, removing the ash tree and replanting it with another species is the most cost effective option. However, there are a few insecticide control options for emerald ash borer that are available on the market.

Treatments, and the cost associated with them, are something to consider when using chemical controls. Many of the insecticides on the market need to be used each year of the tree's life to protect the tree from EAB. These treatments are most effective before EAB infests the ash tree, but it is strongly suggested that chemical controls not be utilized until the pest has been confirmed within 15 miles of where you live. Keep in mind, a chemically treated tree is subject to removal if it is located in an eradication area identified by regulatory agencies.

The insecticide options vary from soil drenching, soil injections, trunk sprays, and trunk injections. At this time, soil drench applications are the only option available to the homeowners. The remaining treatment options tend to be more effective, but would need to be done by an insured reputable tree service.

Soil drenching utilizes a chemical called Imidacloprid that works best for trees that are 8 inches in diameter and under. Imidacloprid can also be applied professionally through soil injections and work well for trees greater than 8 inches in diameter, but would need to be applied once in the spring and again in the fall.

Trunk injections can be done by a professional using Imidacloprid, Bidrin, or Eamectin benzoate. All three options have been successful, but current research suggests that Eamectin benzoate may last up-to 3 years in the tree, making it a more feasible option for long term treatments.

Trunk sprays, such as Dinotefuran with Pentrabark, are not effective over the long term of a tree's life, but can be a useful tool to prevent EAB infestation in a healthy tree located near sites known to have EAB.

Management Solution

Proper woodland and community tree management have a critical role in creating healthy trees. The best insurance a landowner can have when managing their woodlands is to maintain a diversity of tree species; while ensuring an appropriate number of trees are growing on each acre. The best management plan for communities is to create diversity by not having more than 10% of any one species represented. These simple management plans provide the best defense against emerging forest health threats.

Wildlife Impacts

A 2001 National Fish and Wildlife Service survey discovered that 73% of bird watchers visit woodland areas to see some of their favorite birds. In fact, participation in bird watching is 12%

higher in Iowa than the national average and ranks 5th among all states in participation rate by state.²

Ash has moderate importance to wildlife as a food source. Seeds are known to be eaten by wood ducks, finches, and cardinals.

Economic Impacts

Using existing data from Forest Inventory and Analysis plots, Timber Products Output surveys, Timber Price Trend reports and the most recent street tree inventories, we can estimate the potential economic cost of BOB in Iowa.

Based on the latest inventories there are an estimated 52 million ash trees growing within Iowa's 3 million acres of forest. Based on sawmill surveys, we do know how much ash is harvested for wood products use within Iowa. We can estimate the economic impact of this insect to the wood products industry in Iowa. The next table shows the economic impact harvesting ash has annually at current harvesting rates and prices to forest landowners, loggers and sawmills.

Annual Statewide Wood Products Loss

Annual Volume Harvested (bdft)	2,108,000 ³	sawlogs
Estimated Economic value to Landowners	\$421,600	Assuming \$0.2/ bdft revenue
Estimated Economic Value to Sawmills	\$421,600	Assuming \$0.2/ bdft revenue
Estimated Economic Value to Manufacturers	\$421,600	Assuming \$0.2/ bdft revenue
Indirect Economic Impact	\$278,256	1.223 based on IMPLAN 2008
Total Economic Impact	\$1,500,000	

Based on 2011 estimates, Iowa had over 336 million board feet of merchantable size ash growing on all forest land. The potential loss of income of this readily available resource to Iowa forest landowners is summarized in the table below. This is the estimated timber value of the ash resource that exists today in Iowa's forests.

Statewide Landowner Value

Volume Available to be Harvested (bdft)	336,871,000 ⁴	sawlogs
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² Pullis La Rouché, Genevieve. *Birding in the United States: A Demographic and Economic Analysis*. Publication. Washington, D.C.: U.S. Fish and Wildlife Service, 2003. Print.

³ Haugen, David E.; Michel, Dennis D. 2010. Iowa timber industry-an assessment of timber product output and use, 2005. Resource Bulletin NRS-38. Newtown Square, PA: U.S. Department of Agriculture, Forest Service, Northern Research Station. 62 p.

⁴ Miles, P.D. *Forest Inventory EVALIDator web-application version 4.01 beta*. St.Paul, MN:U.S. Department of Agriculture, Forest Service, Northern Research Station. December 13, 2012. <http://fiatools.fs.fed.us/Evalidator4/tmattribute.jsp>

Estimated Existing Economic value to Landowners	\$67,374,351	Assuming \$0.2/ bdft profit
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Tree canopy for Iowa communities averages 12%.⁵ Losses from affected urban trees include the cost of removing the tree, its “landscape value” and the cost of replacing that tree. Landscape value is a catch-all term that includes everything from a tree’s aesthetic value to its impact on property values, pollution removed from the environment and utility costs. Losses from affected urban trees are not annual, but rather a one-time phenomena, although spread out over many years. These numbers assume residential trees on private property represent the same percentages for ash as is being documented during street tree inventories. Community street tree inventories do not take into account ash occurring in city parks and other urban areas or on private residential areas. Communities and homeowners will bear the cost burden of removing dead trees caused by emerald ash borer.

Statewide Urban Tree Loss

Number of Ash Trees ⁶	3,120,000	Based on 26 million urban trees ⁷
Removal Costs ⁸	\$1,560,000,000	\$500/ tree
Replacement Costs	\$468,000,000	\$150/ tree
Landscape Value ⁹	\$ 536,640,000	\$172/ tree annually
Total Economic Impact	\$2,564,640,000	

To determine the total economic impact to the wood products industry, annual industry losses are calculated in the table below using existing harvesting rates. There are not any known viable treatments to help trees in forested areas at this time. Assuming EAB takes 20 years to infect every ash tree in Iowa, we can estimate losses by determining the present value (PV) of each year’s impact. PV translates future dollars into today’s dollars, using a discount rate. One way of thinking about PV is to imagine paying for future losses by putting some money in the bank today. For example, putting \$100 in the bank today at a 4% interest rate could pay for \$104 in damages next year.

Present Value Calculation of Loss of Ash over the next 20 years in Woodlands; assuming 4% discount rate and indirect impact rate of 22%.

⁵ Nowak, David J.; Greenfield, Eric J. 2010. Urban and community forests of the North Central West region: Iowa, Kansas, Minnesota, Missouri, Nebraska, North Dakota, South Dakota. Gen. Tech. Rep. NRS-56. Newtown Square, PA: U.S. Department of Agriculture, Forest Service, Northern Research Station. 70 p.

⁶ Iowa community Forestry Tree Inventories, 23 communities, average number of street trees.

⁷ Nowak, David J.

⁸ Average removal and stump grinding costs, communication with Iowa arboriculture industry.

⁹ Estimated using i-Tree STRATUM Analysis

Year	Wood Products Industry (Future Dollars)	Present Value (2011 Dollars)
2011	\$ 77,154	\$ 74,184
2012	\$ 154,305	\$ 142,665
2013	\$ 231,459	\$ 205,767
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2028	\$ 1,465,902	\$ 695,781
2029	\$ 1,543,056	\$ 704,232
Total (during spread)		\$ 9,656,061
Years 2030 on (Total)	\$ 1,543,056	\$ 17,605,764
Total Present Value of the loss		\$ 27,261,825
Discount Rate		4%
Total Annualized Value of the Loss		\$ 1,090,473

Conclusion

Under these assumptions, the total impact of Emerald Ash Borer to Iowa's wood products businesses is over **\$27 million** or an annualized loss of approximately **\$1 million** in 2011 dollars for now into perpetuity for Iowa's economy. The result changes with the discount rate (for example, the total present value of losses go up if the discount rate goes down to the current Federal Funds rate target of 0.25%). Additionally, other economic losses would include non-timber products like seed production, reduced wildlife habitat and over a **\$2.5 billion** loss of services from community trees. If Iowa can slow the spread, or find a solution to stop the spread of Emerald Ash Borer – losses to homeowners, wildlife, forest landowners and the wood products industry can be mitigated.

If you have potential ash tree infested with Emerald Ash Borer, please contact Tivon Feeley at tivon.feeley@dnr.iowa.gov or 515-281-4915 for answers to your questions.

References

Carver, Erin. *Birding in the United States: A Demographic and Economic Analysis*. Publication. 4th ed. Vol. 2006. Arlington VA: U.S. Fish and Wildlife Service, 2009. Print.

"Planning Ahead for Wildlife Survival: White-Tailed Deer Management | MDC." *MDC* /. Web. 27 December 13, 2012. <<http://mdc.mo.gov/landwater-care/animal-management/deer-management/planning-ahead-wildlife-survival-white-tailed-deer->>.

Pullis La Rouché, Genevieve. *Birding in the United States: A Demographic and Economic Analysis*. Publication. 1st ed. Vol. 2001. Washington, D.C.: U.S. Fish and Wildlife Service, 2003. Print.

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